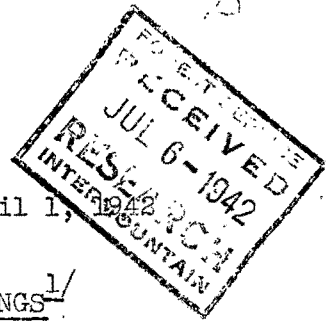


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NUTRITION OF BLACK LOCUST IN FERTILIZED FIELD PLANTINGS^{1/}

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Beginning in 1935, an investigation has been made on application of complete fertilizer at time of planting as a method for improving establishment of black locust on soils of low fertility in old fields and on spoil banks in the Central States region. The center-hole method of mattock planting was used, the spacing was 4 by 4 feet, and the fertilizer was mixed with the soil in the bottom of the planting hole before the tree was set. In one part of the investigation trees were planted on north-slope and corresponding south-slope sites; in another, use was made of 27 mixes of fertilizer with nitrogen, phosphorus, and potassium each varied at three levels, of which one series of aliquots was supplemented with crushed dolomitic limestone and another with pulverized peat; in another, five different levels of fertilizer application were tested. Since in general early survival was not affected by fertilizer applications, in assessing the effect of fertilizer early height increment was used as the single index of success of establishment.

In each experiment, marked response to fertilizing was evident in height growth through the first 2 years in the field. In one series of test plantings, for example, 2-year height growth of fertilized trees averaged 3.0 feet in comparison with 1.3 feet for untreated trees, and the corresponding values for the third year were 3.0 feet and 2.0 feet. Continued superiority in rate of development of fertilized trees after the initial 2-year period is ascribed largely to their better establishment. The results of applying complete fertilizer with each nutrient varied at three levels indicated the desirability of low nitrogen, high phosphorus, and low potassium levels. It could not be concluded that dolomite was a better supplement for fertilizer than peat. Increasing the quantity of fertilizer applied to small seedlings generally effected greater response; however, there was evidence of diminishing returns in the first 2 years' height growth from increased rates of fertilizing.

Leaf analysis was tested as a method for diagnosing nutrition. The results, notably for phosphorus, indicated that the technique of foliage diagnosis employed failed to assess the nutrition of black locust in the test plantings. A study was made of the nutrient content of the woody tops of black locust trees differentially fertilized at time of planting and not fertilized and displaying differences in development that were ascribed to the differences in fertilizer treatment. Markedly and consistently greater

^{1/} This STATION NOTE summarizes an article which will *be published soon* appear in the ~~Journal of Agricultural Research, U.S.D.A.~~ This mimeographed abstract has been prepared in response to requests for information regarding the results of this investigation.

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quantities of dry matter, phosphorus, potassium, and crude ash were found in the trees of each successively higher level of nutrition. A study was made, also, of the comparative height, root extent, top and root weights, and nutrient concentration of fertilized and untreated trees that had had one growing season in the field. Top weight averaged 4 grams for untreated trees but 13 grams for fertilized trees, and root weight averaged 7 grams for untreated trees but 20 grams for fertilized trees. Better nutrition of fertilized trees was not reflected by higher concentration of nutrients. The fertilized trees' advantage in nutrients contained in the woody top and roots approximated on the average 40 percent of the nitrogen, 3 percent of the phosphorus, and 20 percent of the potassium supplied in a 20-gram application of 4-12-4 fertilizer.

Analytic data on concentrations of nitrogen, phosphorus, and potassium in foliage and woody top material of black locust obtained in this study and derived from published reports by other investigators are summarized.

The results obtained indicate that in planting black locust on soils such as those of the experimental sites it is desirable to use in each planting spot fertilizer supplying about 1/2 gram of N, 1 or 2 grams of P_2O_5 , and 1/2 gram of K_2O . Application at this rate in spots spaced 6 by 6 feet represents treatment of 1 acre of soil for each 144 acres planted, and is obviously feasible economically.

For primary plantings on abandoned land of low fertility otherwise suited for black locust, use of this species with application of fertilizer merits consideration. Through application of fertilizers that stimulate crown and root development the protective cover and soil-binding effects of black locust may be attained more rapidly.